

Twostep-by-twostep PIRK-type PC methods with continuous output formulas

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Abstract: This paper deals with parallel predictor-corrector (PC) iteration methods based on collocation Runge-Kutta (RK) corrector methods with continuous output formulas for solving nonstiff initial-value problems (IVPs) for systems of first-order differential equations. At n th step, the continuous output formulas are used not only for predicting the stage values in the PC iteration methods but also for calculating the step values at $(n + 2)$ th step. In this case, the integration processes can be proceeded twostep-by-twostep. The resulting twostep-by-twostep (TBT) parallel-iterated RK-type (PIRK-type) methods with continuous output formulas (twostep-by-twostep PIRKC methods or TBTPIRK methods) give us a faster integration process. Fixed stepsize applications of these TBTPIRK methods to a few widely-used test problems reveal that the new PC methods are much more efficient when compared with the well-known parallel-iterated RK methods (PIRK methods), parallel-iterated RK-type PC methods with continuous output formulas (PIRK methods) and sequential explicit RK codes DOPRI5 and DOP853 available from the literature. ?? 2007 Elsevier B.V. All rights reserved.

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